Claims

1. Method for changing the crest factor of a discrete-time signal which is formed by temporally consecutive signal values of a signal vector, in which method at least one correction vector is calculated as a function of the signal vector and is added to the signal vector, wherein the elements of the at least one correction vector describe a signal, the upper and/or lower envelope curve of which has at least one local extreme value.

2. Method according to Claim 1, wherein the upper and/or lower envelope curve has at least one local maximum.

3. Method according to Claim 1, wherein the upper and/or lower envelope curve has at least one local minimum.

4. Method according to Claim 1, wherein the correction vector is calculated by multiplication of a base vector by a window function.

5. Method according to Claim 4, wherein the window function has at least one window area of consecutive elements, in which the values of the window function differ from zero, the values of the window function outside the at least one window area being zero.

6. Method according to Claim 5, wherein a window area interrupted by a first end of the correction vector is continued at the other second end of the correction vector.

7. Method according to Claim 4, wherein the window functions describe a rectangular window, a triangular window, a Von-Hann window, a Gauss window, a Hamming window or a Blackman window.

8. Method according to Claim 4, wherein the at least one window area of the window function is arranged with respect to the temporal sequence of the elements of the correction vector in such a way that a maximum value of the signal vector lies inside the window area.

9. Method according to Claim 4, wherein the base vector only contains frequency components which lie at the edges of a useful spectrum which extends from a low frequency, in particular the frequency zero to half the sampling frequency of the signal vector.

10. Method according to Claim 9, wherein the elements of the base vector alternately adopt one of two values.

11. Method according to Claim 1, wherein a correction vector is repeatedly calculated and added to the signal vector and the envelope curve of the signals described by the correction vectors used have their at least one local extreme value at different positions.

12. Method according to Claim 11, wherein after the first addition of a correction vector to the signal vector, the following correction vectors are calculated as a function of the total vector produced by the preceding addition.

13. Method according to Claim 1, wherein the signal is a carrier of data, wherein all spectral components of data lie below the sampling frequency of the signal divided by 2^{N-1}, wherein the signal values of the signal vector are divided after filtering in a cyclically alternating manner over 2^N part signal vectors and for each part signal vector at least one correction vector is calculated independently from the respective part signal vector and added to the respective part signal vector, and then the elements of the part signal vector are combined in a cyclically alternating manner to form an output signal vector, wherein N is integral and > = 1.

14. Method according to Claim 4, wherein the elements of the base vector are calculated from the largest element and the smallest element of the elements of the digital signal vector as follows:

$$\Delta y'_k = -\frac{1}{2}\cdot(-1)^k(\max((-1)^k\cdot y_k)+\min((-1)^k\cdot y_k)),$$

where k = 1, …, number of the elements of the signal vector.

15. Method according to Claim 4, wherein the elements of the base vector are calculated from the largest element and the smallest element of the elements of the digital signal vector as follows:

$$\Delta y'_k = -\frac{1}{2}\cdot(\max(y_k)+\min(y_k)),$$

where k = 1, …, number of the elements of the signal vector.

16. Method according to Claim 4, wherein the elements of the correction vector Δy_μ in the window area are calculated as follows:

$$\Delta y_\mu = -Vz \cdot d_{opt} \cdot (-1)^\mu \cdot w(\mu),$$

wherein μ is the running index in the window area and goes from 0 to M-1, $w(\mu)$ is the window function, Xh is an auxiliary vector with the running index μ and the elements of the signal vector in the window area, the maximum element Xh_{max} of the auxiliary vector is located at the position ½*(M-1)+1, Vz equals

$$Vz = \text{sign}\left(Xh\left(\frac{M-1}{2}+1\right)\right)$$

and d_{opt} is calculated as follows:

$$d_{opt} = \text{Min}\left(\frac{Xh_{\max} + Xh_\mu}{1+w(\mu)}\right).$$

17. Method according to Claim 4, wherein the elements of the correction vector Δy_μ in the window area are calculated as follows:

$$\Delta y_\mu = -Vz \cdot d_{opt} \cdot w(\mu),$$

wherein μ is the running index in the window area and goes from 0 to M-1, w(μ), is the window function, Xh is an auxiliary vector with the running index μ and the elements of the signal vector in the window area, the maximum element Xh_{max} of the auxiliary vector is located at the position ½* (M-1)+1, Vz equals

$$Vz = \text{sign}\left(Xh\left(\frac{M-1}{2}+1\right)\right)$$

and d_{opt} is calculated as follows:

$$d_{opt} = \text{Min}\left(\frac{Xh_{\max}+Xh_{\mu}}{1+w(\mu)}\right).$$

18. Method according to Claim 1, wherein the signal vector at the beginning, at a first end, is lengthened by at least one element of the signal vector starting from the opposing second end of the signal vector.

19. Method according to Claim 18, wherein the lengthening of the signal vector at the first end is carried out at the beginning of the method and the at least one correction vector is lengthened corresponding to the lengthening of the signal vector at a first end of the correction vector by at least one consecutive element of the correction vector starting at the opposing second end of the correction vector, so the correction vector and the signal vector are lengthened by the same number of elements.

20. Method according to Claim 1, wherein the signal vector is calculated by inverse Fourier transformation.

21. Method according to Claim 1, wherein the signal vector contains data according to the method of discrete multitone modulation.

22. Method according to Claim 1, wherein the method for data transmission via telephone lines is used according to the ADSL standard.

23. Device for changing the crest factor of a discrete-time signal which is formed by temporally consecutive signal values of a signal vector, the device being set up such that it calculates at least one correction vector as a function of the signal vector and adds it to the signal vector, wherein the device is set up such that it calculates the at least one correction vector such that the elements of the at least one correction vector describe a signal, of which the upper and/or lower envelope curve has at least one local extreme value.

24. Device according to Claim 23, wherein the device is set up for carrying out a method according to any one of Claims 1 to 18.

25. Device according to Claim 23, wherein the device is a signal processor.